RECORDS OF THE BRYOZOAN FAMILY SELENARIIDAE FROM WESTERN AUSTRALIA AND SOUTH AUSTRALIA, WITH THE DESCRIPTION OF A NEW SPECIES OF *SELENARIA* BUSK, 1854

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Unlike that of Bass Strait, the selenariid fauna of southern Western Australia and South Australia is relatively poorly known. A first estimate of its diversity is presented here, based on a study of 514 colonies (in 100 samples), mostly previously unreported specimens collected by Sir Joseph Verco (1851–1935). The study confirms an earlier suspicion that *Selenaria hexagonalis* Maplestone, 1904 actually consists of two species, here distinguished as *S. hexagonalis sensu stricto* and *S. verconis* sp. nov. In all, 16 species are represented, of which 11 constitute new records for the region (South Australia: *Otionella nitida* (Maplestone, 1909), *O. australis* Cook & Chimonides, 1985b, *Selenaria punctata* Tenison-Woods, 1880, *S. concinna* Tenison-Woods, 1880, *S. varians* Cook & Chimonides, 1987, *S. exasperans* Cook & Chimonides, 1987, *S. verconis* sp. nov. and '*S*'. *alata auctt.* (*non* Tenison-Woods, 1880); Western Australia: *S. bimorphocella* Maplestone, 1904, *S. concinna*, *S. hexagonalis* and *S. verconis* sp. nov). Brief descriptions of the genera and species are provided.

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The calcareous element of southern Australian shelf sediments contains in places a high proportion of living bryozoans and dead bryozoan skeletons (Wass *et al.* 1970, James *et al.* 1992). Although many bryozoans live in or on such sediments, the free-living cup-shaped (lunulitiform) species of the anascan family Selenariidae can be particularly abundant in this zone. However, no idea of the abundance and diversity of selenariids in southern Australia was received until the appearance of Cook and Chimonides's studies on the Australasian Selenariidae (Cook & Chimonides 1984a, b, 1985a–c, 1986, 1987). From the Tertiary to the Recent of southern Australia (mainly Victoria and Bass Strait), these authors listed four genera (one new) and 43 species (18 new), many of the latter with an extensive temporal, and sometimes a wide geographical, range.

The marine invertebrate collections of the South Australian Museum include much material obtained by Dr Sir Joseph Verco in the years 1890–1912. Verco was principally interested in molluscs, and the chief method he employed to obtain these (dredging) resulted in the collection of other benthic groups such as brachiopods (Verco & Blochmann 1910), turbinoliid scleractinians (Cairns & Parker 1992) and selenariid bryozoans.

In 1904, in correspondence to Sir Sidney Harmer, C. M. Maplestone mentioned Verco's selenariid collections, and offered to have specimens of his own new species *Selenaria hexagonalis* and *S. bimorphocella*, sent to Harmer by Verco. Subsequently, Livingstone (1928), in discussing Verco's bryozoans in the SAM, listed two samples under *Selenaria punctata* Tenison-Woods and one under *Lunularia capulus* (Busk); comments on these identifications are given below.

Apart from these instances, Verco's selenariids have remained unreported. Inasmuch as his collecting stations ranged from the south-east of South Australia (off Beachport and Cape Jaffa) westward to the Albany and King George Sound districts of Western Australia, they complement those reported by Cook and Chimonides, which were mainly in the Bass Strait, with one off Jurien Bay near Perth.

Verco's selenariid material in the SAM numbers 48 samples. This was augmented by other material, including 19 Verco samples in the QM, four samples from off Perth, 1963 (QM), four from Western Australia (WAM) and four from South Australia, 1982–1991 (SAM). The following article lists the 16 species involved, together with synonymies, references to recent redescriptions, details of material examined, notes on Recent and

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fossil distribution and bathymetric range, and remarks on the distinguishing features of the species and genera.

Materials and methods

Abbreviations of institutions referred to in this paper are: BMNH, Natural History Museum, London; NMV, Museum of Victoria, Melbourne; QM, Queensland Museum, Brisbane; SAM, South Australian Museum, Adelaide; WAM, Western Australian Museum, Perth.

Five hundred and fourteen specimens (colonies) in 100 samples were examined, of which 406 specimens in 69 samples were collected by Sir Joseph Verco. By institution, the material was constituted as follows: SAM: Verco Coll. 268(48), other sources 78(20); QM: Verco Coll. 136(19), other sources 5(4); NMV: Verco Coll. 1(1), other sources 1(1); BMNH: Verco Coll. 1(1), other sources 2(2); WAM: other sources 22(4). Among the specimens examined were five syntypes of *Lunulites patelliformis* Maplestone, 1904 (= *Lunularia capulus* Busk, 1852a) and the lectotype of *Selenaria hexagonalis* Maplestone, 1904. All specimens were Recent except for a Pliocene paratype of *S. verconis*. Unless otherwise specified, all specimens referred to under *Material Examined* were collected by Verco.

Notes on lunulitiform colonies

Although some lunulitiform colonies are attached by rhizoids to shell fragments etc., on the sea-bottom, the free living species are unattached and are stabilized and supported by the elongated avicularian mandibles of the peripheral regions of the colony. Some species are capable of locomotion (see Cook & Chimonides, 1978 and Chimonides & Cook, 1981). They live in, or upon the upper centimetres of sediment, where their dead skeletons also accumulate. Colonies rarely exceed 25 mm in diameter and are conical, cup-shaped or discoid. Each colony, whether spirally or radially budded, has patterned groups of feeding zooids (autozooids) and avicularia, which have elongated, paddle-shaped or whip-like mandibles. Large brooding zooids tend to be found subperipherally or peripherally, and in the genus *Selenaria*, very large, specialized, non-feeding male zooids occur peripherally among enlarged avicularia.

Some species, or populations within species, seem to have particular depth and/or temperature tolerances. For example, living *Selenaria maculata* is common in only 2–4 m in Queensland, but has been found at 146 m in New South Wales; *Otionella affinis* thrives at nearly 250 m off New Zealand. Generally, the most abundant and diverse living fauna seems to occur between 50 and 130 m depth. The material examined here shows few exceptions, but nearly all the best preserved colonies with mandible and frontal membranes intact, which may be inferred to have been alive when collected, occur from depths shallower than 60 m. The exceptions are *Helixotionella spiralis* and *H. scutata*, which together with *S. pulchella* were all originally collected alive from off Jurien Bay, Western Australia at 137 m. All three species were collected alive by Verco from off Albany at 147 m (see below), which suggests that their tolerances are normally at the deeper end of the range.

Systematics

Order Cheilostomatida Busk, 1852b

Suborder Anasca Levinsen, 1909

Superfamily MICROPOROIDEA Gray, 1848

Family SELENARIIDAE Busk, 1854

Genus ***Lunularia*** Busk, 1884

Zooids large with limited cryptocyst, budded radially; avicularia large, simple, with paddle-shaped mandibles; large brooding zooids scattered.

Lunularia capulus (Busk, 1852a)

Lunulites capulus Busk, 1852a: pl. 1, figs 13, 14. 1854: 100, pl. 112.
Lunulites gibbosa Busk, 1854: 100, pl. 111.
Lunulites patelliformis Maplestone, 1904: 215, pl. 25, fig. 6.
Selenaria livingstonei Bretnall, 1922: 190, figs 2, 2a.
Lunularia capulus: Livingstone 1924: 198, 1928: 115; Cook & Chimonides, 1986: 691, figs 6, 9, 12–14.

Material Examined

South Australia: Petrel Bay, St Francis I., 19 fms (34.8 m), SAM L532(1); 13 Nm (nautical miles) (23.8 km) ESE of Troubridge Point, 35 m, K. L. Gowlett-Holmes and S. Corigliano 11–12.vi.1991, SAM L675(1); Investigator Strait, 20 fms (36.6 m), SAM L395(1); Gulf St Vincent, SAM L492–496(5) (syntypes of *Lunulites patelliformis* Maplestone); W of Aldinga, Gulf St Vincent, 38–41 m, K. L. Gowlett-Holmes and S. Corigliano 4–5.v.1987, SAM L533(1); Emu Bay, Kangaroo I., *ca* 35 m, J. Gehling 4.iv.1984, sandy bottom, SAM L549(2); no data, SAM L535, 536(2).

Distribution

Previously known from Torres Straits, Queensland, New South Wales, Victoria, Bass Strait (including Bank Strait between Flinders I. and Tasmania), South Australia and south-western Western Australia, 27.5–167 m, with fossil records from the Miocene and Pliocene of Victoria and the Pliocene of South Australia and Western Australia. Previous South Australian records are from Investigator Strait, Gulf St Vincent and Backstairs Passage; the present material adds St Francis I. and Kangaroo I. to the known range in that State.

Remarks

Of the 13 colonies examined, seven were alive when collected. *L. capulus* is characterized by its large, deeply domed zoaria, and autozooids and avicularia alternating in distally contiguous radial series. The three colonies of L549(2) and L675(1) are the largest so far seen by us, measuring 34, 34 and 35 mm in diameter respectively.

One of the two colonies of L549 bears on its basal surface good examples of basal buds (structures previously described by Cook & Chimonides, 1986: 697–698).

The sheltered, strongly concave basal surface of *L. capulus* is often colonized by other bryozoans. In the present specimens, the most frequent of these is the microporid *Mollia multijuncta* (Waters, 1879), which occurs in samples L492, L532, L549 and L675. The two zoaria of L549 bear also basal colonies of a species of *Arachnopusia* Jullien, 1888, *Chorizopora brongniartii* (Audouin, 1826), *Microporella lunifera* Haswell, 1880 and three species of *Parasmittina* Osburn, 1952. Apart from the small area of *M. multijuncta*, L675 is almost completely encrusted basally with *Membranipora perfragilis* (MacGillivray, 1881), and supports also a small colony of *Scrupocellaria* sp. and a minute individual (3 mm diameter) of a scleractinian coral, probably *Scolymia australis* (Milne Edwards & Haime, 1849). On the basal surface of L533 occurs yet another bryozoan, *Crassimarginatella pyrula* (Hincks, 1881).

Cook (1985: 23–24, 93) discussed the occurrence of acrothoracid cirripedes in large lunulitiform bryozoans, particularly that of *Kochlorinopsis discoporellae* Stubbings, 1967 in West African populations of the cupuladriid bryozoan *Discoporella umbellata* (Defrance, 1823). In our material, these barnacles have been present in samples L492, L532, L533 and L675, as attested by the small slits at the apex of the colonies.

Lunularia repanda (Maplestone, 1904)

Lunulites repandus Maplestone, 1904: 216, pl. 25, fig. 7.

Lunularia repandus: Cook & Chimonides, 1986: 698, figs 7, 8, 10, 15, 16.

Material Examined

Western Australia: 32°S., 115°08'E., off Perth, 119 m, B. Jamieson 28.viii. 1963, QM GH1150(1); King George Sound, 12–14 fms (22–25.6 m), SAM L537(1), 28 fms (51 m), SAM L538(1), 35 fms (64 m), QM GH1693(1); 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), iii.1912, SAM L539(1), 140 fms (256 m), SAM L540(1).

South Australia: Off St Francis I., 35 fms (64 m), SAM L541(1); cove NW of Petrel Cove, St Francis I., 40 m shifting sandy bottom, W. Zeidler & N. Holmes 28.i.1982, SAM L548(3); S of Troubridge I., 20 fms (36.6 m), SAM L542(1); Beachport, 150 fms (275 m), SAM L543(1); no data, SAM L534(1), L544–547(36).

Distribution

Previously known from south-western Western Australia, South Australia and Bass Strait (27.5–183 m) and from the Kermadec Ridge (145–350 m; see Gordon, 1984), and by fossils from the Miocene of New Zealand. The present material adds King George Sound and 80 Nm (146.4 km) W of Eucla to the known Western Australian range, and St Francis I. and Beachport to the known South Australian range, and increases the recorded depth-range to 22–275 m.

Remarks

Of the 49 colonies examined, 29 were alive when collected. *L. repanda* differs from *L. capulus* in having flatter zoaria, and the autozooids in radial series not alternating with series of the avicularia which are very large and scattered. One sample (SAM L547) comprised 18 colonies, several of which exceeded 29 mm in diameter. Colonies in SAM L542 and L548 bore the bryozoan *Mollia multijuncta* (Waters, 1879) (Microporidae) on their basal surfaces.

Genus ***Otionella*** Canu & Bassler, 1917

Zooids budded radially, with small, rounded opesiae. Ancestrula with one distal and one proximal adjacent avicularium. Brooding zooids enlarged, marginal.

Otionella squamosa (Tenison-Woods, 1880)

Selenaria squamosa Tenison-Woods, 1880: 29, fig. 29.

Otionella squamosa: Cook & Chimonides, 1984a: 232, figs 2, 6, 7, 14 g,h, 15, 21E; 1985b: 586, figs 16, 17; Gordon, 1986: 71, pl. 28C.

Material Examined

?South Australia: no data, SAM L550(1).

Distribution

O. squamosa has been reported from Torres Strait, New South Wales, Bass Strait (20–121 m) and New Zealand (1092.5 m), and as a fossil from Victoria and Bass Strait (Pliocene) and New Zealand (Pleistocene). The present specimen, though without details of provenance, is most likely from South Australia.

Remarks

O. squamosa is distinguished by its large, scattered, usually asymmetrical avicularia, with marginally perforated cryptocyst, and prominent condyles unfused or fused on the basal side only.

Otionella nitida (Maplestone, 1909)

Selenaria nitida Maplestone, 1909: 271, pl. 77, fig. 8.
Otionella nitida: Cook & Chimonides, 1984a: 239, figs 14f, 16, 18–20, 21B; 1985b: 584, figs 14, 15, 29.

Material Examined

South Australia: Backstairs Passage, 'deep water', SAM L551(1); Cape Jaffa, QM GH1642(1); no data, SAM L552(4), L553(1).

Distribution

Previously known from south-western and mid-western Western Australia, Bass Strait and New South Wales (17–148 m), with fossil records from south-western Western Australia (Pliocene) and New Zealand (Pleistocene, Miocene). The present material adds South Australia to the Recent distribution of the species.

Remarks

Of the seven colonies examined, two were alive when collected. Colonies of *O. nitida* are very small and domed; the small, symmetrical avicularia, which may occur in contiguous radial series, have a perforated cryptocyst and fused condyles.

Otionella australis Cook & Chimonides, 1985b

Otionella australis Cook & Chimonides, 1985b: 590, figs 11, 12, 23–25.

Material Examined

Western Australia: 32°S., 115°08'E., off Perth, 119m, B. Jamieson 28.viii. 1963, QM GH1150(2); King George Sound, 35 fms (64 m), QM GH1693(3); 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), iii.1912, SAM L554(49); W of Eucla, 50–120 fms (92–220 m), iii.1912, SAM L555(4); 40 Nm (73.2 km) W of Eucla, 72 fms (132 m), iii.1912, SAM L556(2).

South Australia: Cape Jaffa, QM GH1642(55); off Cape Jaffa, 90 fms (165 m), SAM L557(1), 130 fms (238 m), SAM L558(1); no data, SAM L559(1), L560(2).

Distribution

Previously known from south-western Western Australia and Bass Strait, 84–137 m and in the fossil record from south-western Western Australia (Pliocene) and Victoria (Miocene). The present material adds South Australia (south-eastern) and the Western Australian sector of the Great Australian Bight to the species' known distribution, and extends the depth-range to 238 m.

Remarks

Of the 62 colonies in the SAM, 25 were alive when collected. *O. australis* is distinguished by the simple, scattered, almost symmetrical avicularia with long serrated opesiae and large unfused condyles. Most specimens examined (dried or in alcohol) were of a pale blue or deep reddish colour.

Genus ***Helixotionella*** Cook & Chimonides, 1984b

Zooids budded in paired interdigitating spirals. Avicularia with setiform mandibles. Brooding zooids with enlarged opesia.

Helixotionella spiralis (Chapman, 1913)

Selenaria marginata var. *spiralis* Chapman, 1913: 184, pl. 18, fig. 33.
Helixotionella spiralis: Cook & Chimonides, 1984b: 257, figs 6–10, 13, 14, 17, 18, 1987: 962.

Material Examined

Western Australia: 32°S., 115°08'E., off Perth, 119 m, B. Jamieson 28.viii. 1963, QM GH1150(1); 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), iii.1912, SAM L561(2).

Distribution

Previously known from 40 km west of Jurien Bay, Western Australia, 137.2 m, with fossils from Victoria (Oligocene to Pliocene). The present material adds two localities to the species' range in southern Western Australia (one in the Great Australian Bight), and increases the recorded depth-range to 119–148 m.

Remarks

The two colonies in the SAM were alive when collected. In this species, the paired interdigitating

spirals of zooids form the entire minute colony, which rarely exceeds 2 mm in diameter. The avicularian opesia is serrated and the condyles unfused. There is usually only one pair of basal avicularia.

H. spiralis is remarkable for the extent of its temporal range, from Oligocene to Recent (Cook & Chimonides, 1987: 962).

Helixotionella scutata Cook & Chimonides, 1984b

Helixotionella scutata Cook & Chimonides, 1984b: 265, figs 3–5, 11, 15, 16, 19.

Material Examined

Western Australia: 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), iii.1912, SAM L562(9).

Distribution

Previously known only by the type series from 40 km west of Jurien Bay, south-western Western Australia, 137.2 m. The present material adds the Western Australian sector of the Great Australian Bight to the known distribution of this species, and increases its recorded depth-range to 148 m.

Remarks

The nine colonies examined were all alive when collected. *H. scutata* is distinguished by its bifurcated spiral series of zooids, and by its avicularia having fused condyles and an opesia obscured by a flattened scuta.

Genus *Selenaria* Busk, 1854

Zooids budded radially in successive zones. Central zone of closed zooids, surrounded by autozooids and avicularia. Next zone composed of enlarged, female brooding zooids, next zone of peripheral, non-feeding male zooids. Avicularia large, scattered, with S-shaped or reflexed condyle system, mandibles very long, formed from alternating discs of calcified and cuticular tissue.

Selenaria bimorphocella Maplestone, 1904

Selenaria bimorphocella Maplestone, 1904: 213, pl. 24, fig. 3; Cook & Chimonides, 1985a: 301, figs 5d, 15, 16.
Selenaria punctata: Livingstone (non Tenison-Woods) 1928: 114.

Material Examined

Western Australia: 60 Nm (109.8 km) W of Eucla, SAM L563(1); W of Eucla, 50–120 fms (92–220 m), SAM L564 (1); W of Eucla, 72 fms (132 m), QM GH1714(1).

South Australia: 35 Nm (64 km) SW of North Neptunes, 104 fms (190 m), i.1905, SAM L565(3); E of North Neptunes, 45 fms (82 m), SAM L549(1); S of Troubridge I., 20 fms (36.6 m), SAM L567(2); Investigator Strait, 20 fms (36.6 m), SAM L416(3); Investigator Strait, 2 fms (3.7 m),17 fms (31 m) and 20 fms (36.6 m) QM GH1668(21), and no depth, SAM L568(1); off Point Marsden, Kangaroo I., 15 fms (27.5 m), QM GH1646(4); off Ardrossan, 6–8 fms (11–14.6 m), SAM L373(1); Gulf St Vincent, 12 fms (22 m), QM GH1673(1), 17 fms (31 m), SAM L566(77); Yankalilla Bay, 20 fms (36.6 m), SAM L569(6); Backstairs Passage, 17 fms (31 m), QM GH1636(9) and no depth, SAM L570(56); between Backstairs Passage and The Pages, 25 fms (46 m), SAM L572(1); Cape Jaffa, 90 fms (165 m), QM GH1639(1), 1643(1) Beachport, SAM L572(1); no data, SAM L573–577(32).

Distribution

Previously recorded from South Australia (Gulf St Vincent, Investigator Strait and south of Eyre Peninsula) and Bass Strait, 31–183 m, and as fossils from the Pliocene of Victoria. The present material extends the known range westward to the Western Australian sector of the Great Australian Bight, and adds several localities to the South Australian distribution, notably Cape Jaffa and Beachport in the South-East; it also increases the depth range to 3.7–220 m.

Remarks

Of the 172 SAM colonies examined, 45 were alive when collected; L373 and L416 are the samples reported by Livingstone (1928) as *S. punctata*. A further sample identified by Livingstone (MS) as *S. punctata*, from Yankalilla, consists of five colonies of *S. bimorphocella* (L569) and one of *S. concinna* Tenison-Woods, 1880 (L583).

The colonies of *S. bimorphocella* are large and flat, with very large ancestrulae. The species is distinguished by the considerable sexual dimorphism of the zooids (the male zooids having a trifoliate opesia and no opesiules), and the autozooidal cryptocyst having a sinuate opesia.

Pace Cook & Chimonides, 1985a: 303, *S. bimorphocella* does not replace *S. punctata* along the southern coasts of Australia, for the latter does occur there in small numbers (see below). However, to judge from the large number of samples in the present material, *S. bimorphocella* seems to be by far the commonest selenariid in the region.

Selenaria punctata Tenison-Woods, 1880

Selenaria punctata Tenison-Woods, 1880: 9, pl. 2, figs 8a–c; Cook & Chimonides, 1985a: 303, figs 5c, 9, 10, 17, 19.

Selenaria fenestrata Haswell, 1880: 42.
Selenaria partipunctata Maplestone, 1904: 214, pl. 24, fig. 4.

Material Examined

Western Australia: 32°S., 115°08'E., off Perth, 119 m, B. Jamieson 28.viii. 1963, QM GH1150(1); 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), SAM L578(2); 19°32'S., 118°08'E., NW of Port Hedland, 50–52 m, 26.iii. 1982, WAM 4–92(1); 20°19'S., 116°47'E., off Legendre Id, 42 m, WAM 1864–88(19); Mermaid Sound, Dampier Archipelago, 10.ii.1981, WAM 2–92(1); between Dampier and Port Hedland, WAM 87–89(1).

South Australia: Off Cape Jaffa, 130 fms (238 m), SAM L579(1).

Distribution

Previously recorded from Western Australia, eastern Queensland and New South Wales, 11–137 m, also as a fossil from south-western Western Australia (Pliocene). The present material adds South Australia (South-East) and the Western Australian sector of the Great Australian Bight to the known range of the species, and extends the lower depth-range to 238 m.

Remarks

As noted above, Livingstone's (1928) report of *S. punctata* from South Australia is referred to *S. bimorphocella*. The colonies of *S. punctata* are small, domed, with small ancestrulae; the autozooidal opesiae are D-shaped with closely-apposed opesiules; brooding zooids have a bar across the orifice, and male zooids have long, paired opesiules. Some of the colonies from Western Australia (SAM) have a diameter of only 3 mm and still retain frontal membranes, but few or no mandibles, many of the others (WAM) are worn. The colony from South Australia is very worn.

The widespread *S. punctata* is very similar to *S. parapunctata* Cook & Chimonides, 1985a, which appears to replace it in Bass Strait (see Discussion). *S. parapunctata* differs by its widely spaced opesiules, absence of an orificial bar in brooding zooids, and S-shaped, rather than reflexed avicularian condyles.

Selenaria pulchella MacGillivray, 1895

Selenaria squamosa var. *pulchella* MacGillivray, 1895: 48, pl. 7, fig. 13.
Selenaria pulchella: Cook & Chimonides, 1984b: 262; 1985a: 307, figs 4, 20.

Material Exanined

Western Australia: 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), SAM L580(3).

Distribution

Previously recorded from Jurien Bay, 137 m, south-western Western Australia, with fossils from the Miocene of Victoria. The present sample adds the Western Australian sector of the Great Australian Bight to the species' known range, and increases the depth-range to 148 m.

Remarks

Of the three colonies examined, two were alive when collected. The colonies of this species are minute (2–3 mm in diameter). The zooids have small lateroproximal opesiular indentations, the male zooids possess small paired opesiules, and the avicularia have punctate frontal shields. All three present colonies were sexually mature, with male zooids and large peripheral avicularia, though no mandibles were present.

Selenaria concinna Tenison-Woods, 1880

Selenaria concinna Tenison-Woods, 1880: 10, pl. 2, figs 11a–c; Cook & Chimonides, 1987: 950, figs 1, 11, 24, 28, 30.

Material Examined

Western Australia: 80 Nm (146.4 km) W of Eucla, 81 fms (148 m), SAM L581(1).

South Australia: 35 Nm (64 km) SW of North Neptunes, 104 fms (190 m), i.1905, SAM L582(2); Yankalilla Bay, 20 fms (36.6 m), SAM L583(1); Backstairs Passage, SAM L584(5); Cape Jaffa, 90 fms (165 m), QM GH1643(3).

Distribution

Previously recorded from eastern Queensland, New South Wales, Bass Strait and New Zealand, 33–148 m, and as a fossil from the Pliocene of Western Australia and the Miocene of Victoria. The present material adds South Australia and Western Australia, to the species' known range, and extends the lower depth-limit to 190 m.

Remarks

One of a complex of five very similar species (Cook & Chimonides, 1987), *S. concinna* is distinguished by its avicularia, which have a serrated proximal opesia and a distal calcified bridge. None of the present specimens is larger than 7 mm in diameter, and all are slightly worn.

Selenaria varians Cook & Chimonides, 1987

Selenaria varians Cook & Chimonides, 1987: 957, figs 2, 32, 33.

Material Examined

South Australia: 35 Nm (64 km) SW of North

Neptunes, 104 fms (190 m), i.1905, SAM L585(3); Cape Willoughby, Kangaroo I., 23 fms (42 m), QM GH3160(1).

Distribution

Previously recorded from Bass Strait and New South Wales, 46–95m. The present material adds South Australia to the known distribution of the species, and amplifies the depth-range to 42–190 m.

Remarks

The four colonies examined have a maximum diameter of 4 mm and are all slightly worn. *S. varians* is distinguished by its autozooidal opesiae becoming proportionately larger with astogeny. The avicularia have a marginally serrate opesia.

Selenaria exasperans Cook & Chimonides, 1987

Selenaria exasperans Cook & Chimonides, 1987: 957, figs 5, 12, 34, 35.

Material Examined

South Australia: 35 Nm (64 km) SW of the North Neptunes, 104 fms. (190 m), i.1905, SAM L586(2); Cape Jaffa, 130 fms (238 m), SAM L587(1); Cape Jaffa, 90 fms (165 m), QM GH1639(2); Beachport, 110 fms (201 m), SAM L588(2).

Distribution

Previously recorded from Bass Strait and New South Wales, 79–148 m. The present series adds South Australia to the known distribution, and extends the depth-range to 238 m.

Remarks

S. exasperans is distinguished by the presence of a proximo- and disto-lateral avicularium beside the ancestrula, a pattern unique in the genus. Autozooidal opesiae are D-shaped, and avicularian opesiae serrate. All five colonies examined (maximum diameter 4 mm) are slightly worn, but clearly show the ancestrula and adjacent avicularia and autozooids.

Selenaria hexagonalis Maplestone, 1904
(Fig. 1, A)

Selenaria hexagonalis Maplestone, 1904 (part): 214, pl. 24, fig. 5; Cook & Chimonides, 1987 (part): 948, figs 10, 20, 21 (not figs 8, 22, 23, = *S. verconis* sp. nov.)

Material Examined

Western Australia: King George Sound, 28 fms (51 m), SAM L589(1); no data, SAM L590–592(22).

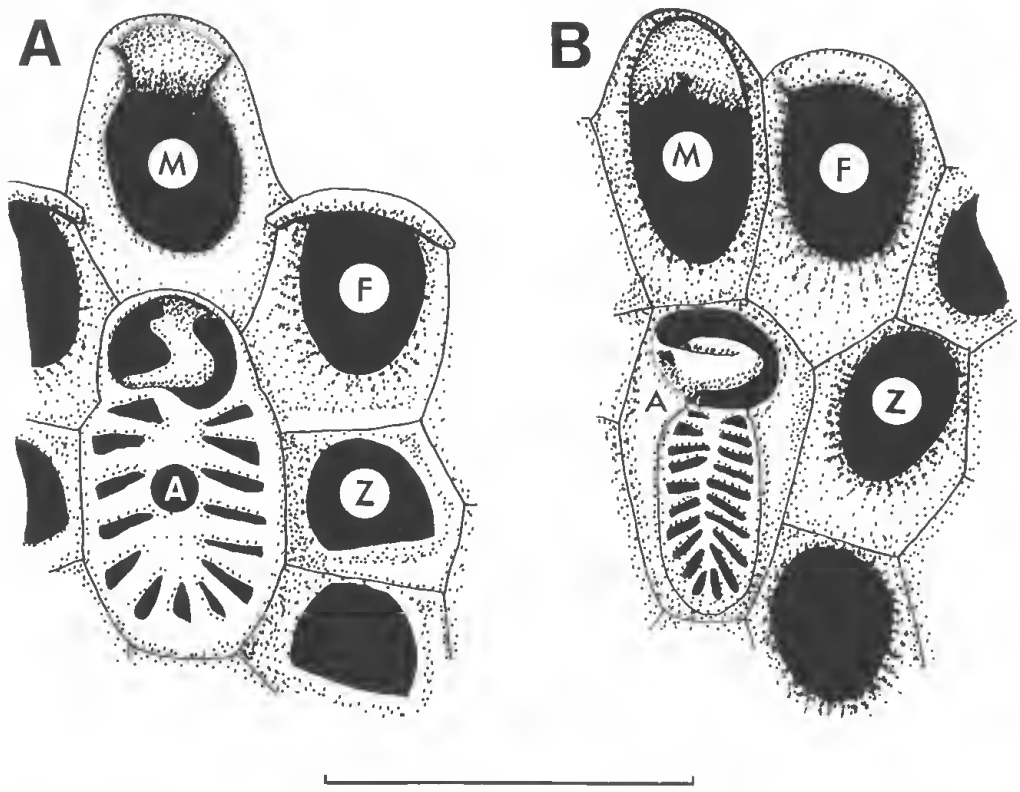

FIGURE 1. Sketches of zooids of *Selenaria*; M, male, F, female, Z, autozooid, A, avicularium. **A**, *S. hexagonalis* Maplestone. **B**, *S. verconis* sp. nov. Scale = 0.50 mm.

South Australia: Investigator Strait, 15 fms (27.5 m), NMV P62753, lectotype (selected by Cook & Chimonides, 1987: 948).

Distribution

Known from King George Sound, south-western Western Australia, 51 m and Investigator Strait, South Australia, 27.5 m.

Remarks

Colonies large (diameter 13–15 mm when sexually mature), robust and thickened basally. Autozooids hexagonal in frontal view, with subcentral, almost circular opesia. Centre of operculum just distal to centre of opesia. Subperipheral brooding zooids large, with elongated opesia, raised distally. Peripheral male zooids with very large, oval opesia, without subopercular tubercle. Avicularian shield with 12–16 stout bars, fused medially; condyle system not much reflexed, S-shaped.

The distinctness of this species from the next (*S. verconis* sp. nov.) was suspected by Cook & Chimonides (1987). *S. hexagonalis sensu stricto* has a more restricted range than *S. verconis* sp. nov., being known with certainty from only one district in Western Australia and one in South Australia.

One very large colony (one of the nine in SAM L591), 14 mm in diameter, had apparently ceased growing when 11 mm in diameter, just before sexual maturity. Subsequent growth around the perimeter is marked by swollen basal calcification and concentric series of brooding and male zooids, interspersed with large avicularia. The avicularia are orientated radially, and their condyle systems seem normal, but the frontal shield of bars of calcification is orientated at right angles to the normal direction. The setiform mandibles would not have been affected by the orientation of the frontal shield. The two other mature colonies in this sample show no abnormalities. One of the three colonies in sample SAM L592 has large acrothoracid cirripede burrows in the central area.

Selenaria verconis sp. nov.
(Fig. 1, B)

Selenaria hexagonalis Maplestone, 1904 (part): 214 (Jimmy's Point Farm, Victoria, Pliocene); Cook & Chimonides, 1987 (part): 948, figs 8, 22, 23.

Material Examined

HOLOTYPE: **Queensland**: Off Townsville, 2.5–12 m, coll. Cook & Chimonides, 1982, BMNH 1984. 12.24.14 (illustrated by scanning electron micrographs in Cook & Chimonides, 1987, figs 8, 22, 23).

PARATYPES: **Western Australia**: King George Sound, 22–28 fms (40–51 m), SAM L593(1), SAM L594(1); ditto, 28 fms (51 m), SAM L594 (1); 40 Nm (73.2 km) W of Eucla, 75–105 fms (137–192 m), iii.1912, SAM L596(1).

South Australia: Off Adelaide, 36–64 m, BMNH 1928.9.13.78.

Queensland: Port Denison, BMNH 1984.12.24.36.

Victoria (Pliocene): Jimmy's Point Farm, coll. Maplestone. NMV T1757. (Last three samples and holotype listed under *S. hexagonalis* by Cook & Chimonides, 1987: 948).

Description

Colonies 10–11 mm when sexually mature. Autozooids with oval or suboval opesia, proximal edge sometimes almost straight; cryptocyst finely serrated. Operculum dark, placed above the distal half of the opesia. Subperipheral brooding zooids large, raised distally. Peripheral male zooids with elongated oval or pyriform opesia; subopercular tubercle absent. Avicularian shield with 14–20 fine bars, fused medially; frontal area narrowing distally, flanked by cryptocystal margins of adjacent zooids; condyle system reflexed.

Etymology

Verconis, L., genitive singular of Verco (construing the surname as a noun of the Third Declension); named after Dr Sir Joseph Cooke Verco (1851–1935).

Distribution

Known from south-western Western Australia (King George Sound), South Australia (Gulf St Vincent) and eastern Queensland, 2.5–192 m, and as a fossil from the Pliocene of Victoria.

Remarks

When redescribing *S. hexagonalis*, Cook & Chimonides (1987) noted the wide range of character states shown by both Maplestone's specimens and those in the BMNH, concluding that two partly sympatric forms might be involved. The four colonies from Western Australia examined here, some of which were collected with *S. hexagonalis s. s.*, have the unequivocal character correlations of the Queensland specimens. This indicates, as previously suspected, that two distinct and sympatric species are present, one (*S. hexagonalis*) with a restricted distribution the other (*S. verconis*) with a wider geographical range and a fossil record.

S. verconis most resembles *S. hexagonalis* Maplestone, differing by its less robust zoaria, smaller and proportionately longer zooids with oval to suboval opesiae and more distal opercula, and by the avicularia having 14–20 fine bars (*vs* 12–16

stout bars in *S. hexagonalis*) and a more reflexed condyle system (see Fig. 1B).

'Selenaria' alata auctt.

Selenaria alata: Cook & Chimonides, 1985c: 339, figs 1, 2, 5, 9, 11–13 (Recent material only). *Non Selenaria alata* Tenison-Woods, 1880: 11, pl. 2, figs 12a–c.

Material Examined

South Australia: 35 Nm (64 km) SW of the North Neptunes, 104 fms (190 m), i.1905, SAM L597(3); no data, SAM L598(1).

Distribution

Known previously only from Bass Strait, 46–95 m. The present material adds South Australia to the recorded range of the species, and increases the lower depth-limit to 190 m.

Remarks

Of the four colonies examined, one was alive when collected. This species is characterized by its large, asymmetrical, unfused avicularian condyles and large trifoliate autozooidal opesiae.

The Recent colonies from Bass Strait were all regenerated from fragments, and differed slightly from fossil *S. alata* in their less trifoliate autozooid opesiae. The present specimens do not exceed 12 mm in diameter, and two have mandibles resembling those of *Otionella squamosa*, see Cook & Chimonides (1985c, fig. 11). The ancestrulae are all worn or partly obscured, but do not appear to be as large as those of the fossil colonies. The autozooidal opesiae resemble those of the Bass Strait population, and are only slightly trifoliate. The somewhat ambiguous character of Recent *S. alata auctt.*, which shares features with both fossil *S. alata* and *S. lata*, will be discussed in a later article (Bock & Cook in prep.). The character of the avicularian condyles and mandibles of *S. lata*, *S. alata* and *S. alata auctt.*, together with the absence of zones of distinctive brooding and male zooids, means that none of these three species can be referred to *Selenaria s. s.*, and they require a generic grouping of their own.

Discussion

The present collections, though sparse in comparison with those previously reported from Bass Strait and New Zealand (Cook & Chimonides, 1987 and references therein; Nelson *et al.* 1988), are nevertheless significant in that they allow a first estimate of the diversity of the Selenariidae occurring in southern Western Australia and South Australia. The 16 species listed constitute a fairly diverse fauna, comparable to that of Bass Strait with its 18 species. New State records are: Western Australia: *Selenaria bimorphocella*, *S. concinna*, *S. hexagonalis* and *S. verconis*; South Australia: *Otionella nitida*, *O. australis*, *S. punctata*, *S. concinna*, *S. varians*, *S. exasperans*, *S. verconis* and *'S'. alata auctt.* Whereas most of the new locality records constitute only minor range-extensions (e.g. *S. concinna*), the extension in some cases is considerable. For example, *Helixotionella spiralis*, *H. scutata* and *S. pulchella*, previously known in the Recent only from the Jurien Bay district of Western Australia, are reported from the Eucla district of the Great Australian Bight, some 1 700 km to the south-east. Sufficient samples have now been analyzed from Bass Strait to permit the suggestion that these last three species are today genuinely absent from that region (though *H. spiralis* and *S. pulchella* have a fossil record in Victoria), and that the Great Australian Bight may well mark the eastern limit of their modern distribution. In addition, *S. hexagonalis* is reported from the Albany district of Western Australia, over 2 000 km west of its previous western limits in South Australia, and *S. varians* and *S. exasperans* are shown to occur at St Francis I., 1 000 km west of their original localities in Bass Strait (with *S. exasperans* occurring also at the intermediate localities of Cape Jaffa and Beachport in south-eastern South Australia).

The distribution of the species-pair *S. punctata* and *S. parapunctata* is of particular interest. The former is now known from most parts of the Australian continental shelf except Bass Strait, the Northern Territory and northern Queensland. Its absence from relatively well-collected Bass Strait may be real; moreover, in Bass Strait it appears to be replaced by *S. parapunctata*, which so far has not been reported from elsewhere.

Of the 18 species currently known from Bass Strait, seven are still notably absent from collections made further west: these are *Otionella minuta*, *O. auricula*, *Selenaria initia*, *S. minor*, *S. maculata*, *S. kompseia*, and *S. maplestonei* (see Cook & Chimonides, 1985a, b; 1987). It is possible that at least some of these will eventually be found in South Australia and Western Australia. After the discovery of living *H. spiralis*, *S. pulchella*, *S. initia* and *S. minor* (originally described as fossils), it is possible that, with further collecting, other fossil species will also be discovered to be extant.

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